UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte KWANG-WOOK KIM, EIL-HEE LEE,
JUNG-SIK KIM, KI-HA SHIN,
and
BOONG-IK JUNG

Appeal No. 2005-1934
Application No. 10/022,357

ON BRIEF

Before KRATZ, TIMM, and JEFFREY T. SMITH, *Administrative Patent Judges*.

TIMM, *Administrative Patent Judge*.

DECISION ON APPEAL

This appeal involves claim 2, the only claim pending in the application. We have jurisdiction over the appeal pursuant to 35 U.S.C. § 134.

INTRODUCTION

Claim 2 is directed to a method of manufacturing a catalytic oxide anode. According to the specification, catalytic oxide anodes formed from ruthenium oxide or iridium oxide applied to a titanium base metal (RuO_2/Ti or IrO_2/Ti) have been known in the art (specification, pp. 3-6). According to the specification, these anodes have been conventionally sintered at temperatures lower than 550 °C because oxidation of the titanium base metal occurs at higher temperatures increasing the resistance of the oxide anode surface and reducing the oxide anode activity (specification, pp. 3-4). However, higher sintering temperatures are desirable in order to obtain optimal decomposition of organic substances when the anode is used to remove organic substances from water (specification, p. 4). Appellants are able to sinter their anode at temperatures above 600 °C because they form a TiO_2-screening layer between the titanium base metal and the catalytic oxide anode. The screening layer prevents the oxidation of the titanium base metal during the high temperature sintering operation (specification, p. 1 and p. 12). The screening layer is a metal oxide layer of TiO_2, SnO_2, RuO_2, or IrO_2. The TiO_2-screening layer is itself sintered at 450-550 °C. Claim 2 is illustrative of the subject matter on appeal:

> 2. A method for manufacturing a catalytic oxide anode using high temperature sintering, wherein a TiO_2-screening layer, which is a metal oxide layer of TiO_2, SnO_2, RuO_2, or IrO_2, sintered at 450 to 550°C, is added between titanium support and a surface of the oxide anode, coated with a precursor solution of $RuCl_3$ or $IrCl_3$ in hydrochloric acid according to a brushing or dipping method, dried at 60°C for 10 min, thermally treated at 250 to 350°C for 10 min, and finally sintered at 600 to 700°C for 1 to 2 hours, said TiO_2-screening layer serving as an [sic] valve metal oxide for preventing the activity of the anode from being lowered owing to the oxidation of a titanium base metal caused upon

sintering of the anode at high temperature and the solid diffusion of an oxide into the anode surface, said valve metal oxide being selected from the group consisting of TiO_2, SnO_2, RuO_2, and IrO_2 sintered at 450 to 550°C.

The Examiner maintains a rejection against claim 2 under 35 U.S.C. § 103(a). As evidence of unpatentability the Examiner relies upon British Patent 1,480,807 issued to Beer and published July 27, 1977 (Beer).

We affirm substantially for the reasons provided by the Examiner as expressed in the Answer and the prior Office Action of April 6, 2004 referenced in the Answer (Answer, p. 2). We add the following primarily for emphasis.

OPINION

The Examiner's rejection is based upon the disclosure in Beer of a method of forming a catalytic oxide anode of RuO_2 type with a metal oxide layer of TiO_2 between the titanium support and the RuO_2 coating (Office Action of April 6, 2004, pp. 3-4). According to the findings of the Examiner, both the first metal oxide layer and the RuO_2 layer are subjected to a three step heating process (*Id.*). The main difference between the method of Beer and that of the claim lies in the temperatures and times of the heating (*Id.*). Considering the teachings of Beer as a whole, we agree with the Examiner, based on the fact that both Beer and Appellants perform the heating to form and adhere the oxide layers onto the support and to provide optimal properties in the anode, that optimization of the temperatures and times would have been a matter of routine experimentation within the ordinary skill in the art (*Id.*). In such a circumstance, it is reasonable

to shift the burden to Appellants to show that the particular range claimed is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936-37 (Fed. Cir. 1990).

Appellants argue that "the subject matter of pending claim 2 requires sintering at two different temperatures, namely both sintering at 450°C to 550°C **and** at 600°C to 700°C. As Beer, at best, only very broadly mentions a single oxide formation and adherence step at 400°C-650°C, present claim 2 would not have been obvious over Beer for this reason alone." (Brief, p. 6).

We cannot agree that Beer is limited to a teaching of only one oxide formation and adherence step. As the Examiner points out, Example 6 describes a method in which two oxide layers are formed. Particularly, as set forth in Example 6, a plate of titanium is provided with a layer of metal oxide and then a further layer of ruthenium oxide (RuO_2). The plate coated with the first metal oxide layer is subject to the three heat treatments as in the preceding example (p. 3, ll. 106-108), a reference to Example 5. Example 5 describes drying at 105 °C, raising the temperature to 210-250 °C for 12 hours, and then heating at 475-580 °C for 20-50 minutes (p. 3, ll. 75-83). The last temperature range overlaps the claimed range of 450-550 °C. Example 6 of Beer then indicates that the coated plate is further coated with ruthenium oxide "in accordance with the present invention." (p. 3, l. 125 to p. 4, l. 2), i.e., dipping the support or brushing it with ruthenium chloride in hydrochloric acid and applying the three step heat treatment (see, e.g., Examples 3-4 and p. 1, l. 87 to p. 2, l. 13). Example 6 describes the formation and adherence of

two oxide layers, each involving heating to form, adhere and harden the layer onto the surface supporting it. We agree with the Examiner that Beer suggests two distinct sintering operations each at temperatures that overlap the temperatures claimed (Answer, pp. 2-3). That is enough, in the present circumstances, to support a prima facie case of obviousness and shift the burden to Appellants to show criticality of their claimed ranges. *Woodruff*, 919 F.2d at 1578, 16 USPQ2d at 1936-37.

Appellants' interpretation of the reference provided in the Reply Brief is unpersuasive as well (Reply Brief, pp. 3-5). We cannot agree that the first and second steps described in Example 6 of Beer are really only a single step (Reply Brief, p. 3). Beer specifically discloses applying three heat treatments to the plate coated with a porous layer (0.01-10 mm) of metal oxide (p. 3, ll. 89-108) and then discloses "[a] plate thus provided with a porous oxide coating in a thickness of 0.01 to 10 mm is then coated with ruthenium oxide ... in accordance with the present invention" (p. 3, l. 125 to p. 4, l. 2). Clearly, two layers of material are formed on the titanium plate. Moreover, the "present invention" of Beer is a process of applying a coating using a solution and a three step heat treatment (p. 1, l. 92 to p. 2, l. 13). Example 6 makes it clear that there are two steps of applying a solution and heating at three temperature levels.

Appellants acknowledge that Beer suggests sintering at 400-650°C, a temperature range that overlaps the ranges claimed, to oxidize a coating solution, but Appellants point out that, in the course of practically producing the electrode, the sintering temperature does not exceed 550°C because temperatures above 600°C undesirably oxidize the base metal (Brief, p. 6). As

noted by the Examiner, Appellants' assertion contradicts with what is taught in Beer (Answer, p. 3). Appellants, however, cite no particular prior art reference or other evidence indicating that those of ordinary skill in the art would, in fact, not practice the sintering at the upper levels of the 400-650°C range specifically suggested by Beer, particularly in the embodiment where there is a metal oxide layer between the metal base and the RuO_2 layer as taught in Example 6 of Beer. We note that attorney argument is not evidence. *In re Lindner*, 457 F.2d 506, 508, 173 USPQ 356, 358 (CCPA 1972). The evidence as a whole supports the position of the Examiner.

Appellants argue that Beer does not mention the TiO_2-screening layer of the claim (Brief, p. 8). This argument is not convincing because Beer describes including a TiO_2 layer between the titanium support and the oxide anode of RuO_2.[1] It is reasonable to conclude that the TiO_2 layer of Beer would perform the screening function of the claim as found by the Examiner due to the similarities of the materials and processing of that layer to Appellants' TiO_2-screening layer (Office Action of April 6, 2004, p. 4).

Much of Appellants' argument is directed to differences between an anode with a TiO_2-screening layer and one without that layer. We, like the Examiner, find those arguments unpersuasive because they ignore the teaching in Beer of an intervening TiO_2 layer (Answer, p. 4). Beer represents the closest prior art. Therefore, the correct comparison here is between anodes having both oxide layers, i.e, a TiO_2 layer and a RuO_2 layer, as set forth in Example 6 of

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[1]The listing of only four metal oxides for the metal oxide layer describes the use of each of those materials including TiO_2 to one of ordinary skill in the art.

Beer, sintered at various temperatures within the claimed ranges compared to the broader disclosed ranges of Beer. A showing that the claimed temperature ranges are critical would overcome the prima facie case of obviousness.

Appellants argue that Beer does not mention that the performance of the electrode is unexpectedly improved when sintering at temperatures above 600°C (Brief, p. 7). However, because Beer specifically describes a temperature range that overlaps the claimed range, no disclosure of an unexpected improvement within that range is required within Beer. The disclosure of overlapping ranges is enough to establish a case of prima facie obviousness and shift the burden to Appellants with regard to showing criticality of the claimed combination of temperature ranges for their result. Appellants do not rely upon any showing that compares properties of the two oxide layer structure of Example 6 of Beer, sintered as disclosed therein, with the claimed structure, sintered at the claimed temperatures. Appellants' discussion of the benefits described in the specification is not on point because the specification focuses on differences between the claimed two oxide layer preparation and anodes made without any intermediate layer. But Beer represents closer prior art because Beer includes an intermediate layer. The more probative comparison would be between the claimed method and the method of the closest prior art, i.e, the method of Beer. No such comparison is made by Appellants.

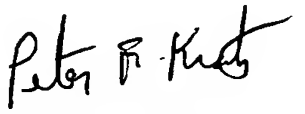
We conclude that the Examiner has established a prima facie case of obviousness with respect to the subject matter of claims 2 which has not been sufficiently rebutted by Appellants.

CONCLUSION

To summarize, the decision of the Examiner to reject claims 2 under 35 U.S.C. § 103(a) is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED



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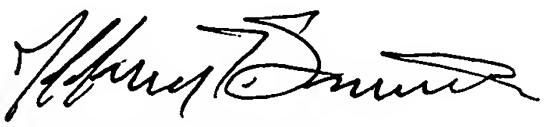
CATHERINE TIMM
Administrative Patent Judge



JEFFREY T. SMITH
Administrative Patent Judge

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